



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/509,431	07/27/2005	Rob Short	P-7715	7450
32752	7590	06/09/2010		
David W. Highet, VP & Chief IP Counsel Becton, Dickinson and Company (Hoffman & Baron) 1 Becton Drive, MC 110 Franklin Lakes, NJ 07417-1880			EXAMINER PADGETT, MARIANNE L	
			ART UNIT	PAPER NUMBER
			1715	
			MAIL DATE	DELIVERY MODE
			06/09/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/509,431

Applicant(s)

SHORT ET AL.

Examiner

MARIANNE L. PADGETT

Art Unit

1715

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 41-76 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 41-76 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/C)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date: _____

1. Applicant is **reminded** that when making amendments that delete less than five characters, especially single characters, such as "a" or numerical symbols such as "4", with which it is difficult to see a strike-through, applicants should consider employing double brackets, i.e. [[a]] to avoid noncompliant amendments, for amendments that could cause problems at the printers. For instance, the deletion in the third to the last line of independent claim 41 is **very** difficult to see.

2. **Claims 41-76** are rejected under 35 U.S.C. **112**, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicants have made arguments with respect to independent **claim 41**, which implied that the clarity problems therein are simply a matter of the examiner's own preferences, however employing illogical scientific statements is not a mere matter of preference, as in styles of writing, but creates a lack of clarity with respect to what process is actually being performed. As previously discussed claiming "using... organic compound monomer as a source to produce a plasma..." has such logic problems, as it literally says that the monomer is the source that produces the plasma. Aside from literally requiring the monomer to actually produce the plasma, as opposed to typical energy sources such as RF, DC, microwave; if the reader makes unclaimed assumptions that the monomer was actually used as a source material from which the plasma was made (instead of what is actually claimed), given the current phrasing one has to decide whether or not this assumption means that the claims must require that the monomer employed be capable of sustaining the plasma without the use of any plasma gas, since it is the "source" used to produce the plasma. In other words, if applicant actually intending to claim as their arguments are ambiguously implying that any monomer employed must be a plasma gas, capable of sustaining a plasma? Applicants' resistance to amending their claims so that they actually make scientific sense with **clarifying language**, such as -- using at least one organic compound monomer as a deposition

Art Unit: 1715

source when producing a plasma from which the plasma polymer is deposited --, or whatever relationship they actually intend/meaning, is not understood by the examiner.

As previously discussed, to the best at the examiner's knowledge, it is not possible to create a plasma using a monomer, one must input energy, such as RF energy to cause excitation **to produce a plasma**, hence it is unclear in independent **claim 41** how applicants are "using at least one organic compound monomer as a source to produce a plasma", i.e. the source for generating the plasma = organic monomer, which is what actually being claiming! Would applicants actually mean something more scientifically logical, such as -- using at least one organic compound monomer as a polymer source material when producing a plasma... --? In other words, while one may be using a gas or vapor when producing a plasma, a gas or vapor does not itself produce the plasma!

Applicants' phrasing in **claim 41**, line 6, reciting "(i) the monomer source" also has interpretation problems, as while the preceding language may construe "... monomer as a source" \equiv the monomer source, which would be the input port for the monomer into the plasma or moving the container that supplies the monomer, or the like; however read in light of the specification no discussion was found of moving the monomer source with respect to the substrate when there was a mask (e.g. mask plate) present, so it is unclear how one is supposed be moving the source of the monomer (which one is using to produce the plasma) relative to the substrate's location. This is also particularly relevant to **claim 43** (also see section 3 below). If one assumes that the intended meaning for producing the plasma was as suggested above, that the organic monomer(s) is used when producing the plasma, so as to enable plasma deposition of a plasma polymer, one must still determine what is encompassed by moving the "monomer source" relative to the substrate, where the monomer source is used when producing the plasma, thus are you moving containers that supply the monomer to the plasma chamber or moving their input ports; or are the actual

Art Unit: 1715

monomers considered synonymous with the monomer source, such that it would read on mere input of the monomers into the plasma, since the monomers must move to be input into a plasma chamber? While the examiner strongly suspects that the intent was to move plasma excited species formed from the monomers in relation to the substrate, as these species are output from the plasma generation zone, however nothing in the specification was found by the examiner to associate any such movement with the required mask plate, nor does the claimed "monomer source" properly correspond to such a meaning (while most logical or useful, it's the least consistent with the claim language). Given the lack of clarity & precision in the claims, and since the monomer source cannot be clearly read in light of the specification for the claims as written, for purposes of consideration over prior art, any possible meanings may be considered with respect to applied prior art.

Applicants amendment has corrected the previously discussed problem with respect to claims depending from dependent claims 54 & 55, however there remain clarity issues with respect to how depending **claims 57 & 58** relate to the limitation of dependent claim 56, or how dependent **claim 60** relates to limitation of claim 59, as it remains uncertain as phrased whether or not the limitations of claims 57, 58 & 60 are further limiting the previously recited "... ethylenically unsaturated organic compound" or "... compounds", since in these 3 claims what is said to be further limited is the limitation introduced in the independent claim which is "at least one organic compound monomer", thus creating ambiguities as to whether the broad independent claim limitation is referred to, or one organic monomer as further limited in the specified dependent claim. Note in the case of claim 56 creates potential inconsistencies with the "consists essentially of" requirement. In claim 59 note that the recited mixture of compounds, and is in the plasma polymer deposit, not in the source material (i.e. requiring that the deposit is multiple ethylenically unsaturated organic compounds).

Claim 58 is **objected** to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. As discussed above these dependent claims contain *options* which read on limitations broader than previously required limitations, thus fail to properly further limit a preceding claim.

3. **Claims 41-76** are rejected under 35 U.S.C. **112, first** paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants have added new limitations to the independent claim 41 with respect to the claim mask plate, and stated in the first sentence of the Remarks that "support for the claim amendments can be found throughout the specification and in the claims as originally filed". However, the claims as originally filed appear to make absolutely no mention of use of a mask or mask plate, and citing the entire specification is next to useless for clear indication of support. Applicants' amendment has changed "a aperture" to "at least one aperture" & required "the mask plate being spaced from the substrate". The examiner has reviewed applicants' specification to find the alleged support, and finds that **page 6**, lines 7-15, discussed the "plasma writing" for making 2 or 3-dimensional patterns "without the need to prefabricated masks or stencils"; **page 14**, line 12 generically mentions mask plate, with lines 17-23 discussing "The '**writer**' element consists of a '**nib**' which contains a small feature which is used to 'write' chemistry onto the surface. Examples of such nibs include single holes, multiple holes, single or multiple holes where the dimensions may range from 2 micron up to several centimetres... the **nib** may be an intricate part of the plasma source in (for example) the case of a microcapillary. In this case that term 'nib' refers to the aperture at the end of the capillary", however from this discussion the 'nib' has no apparent relationship to the masking plate, nor does figure 1 provide any clarification with respect to

Art Unit: 1715

these features. **Page 15**, lines 26-page 16, line 2 discuss the "sample is raised so as to be **extremely close** to the Mask Plate (but **without touching**). The mask plate consists of a stainless steel plate, with a **small aperture** that defines the features to be deposited... the plasma is guided by the aperture and forms a polymeric deposit on the surface beneath it. Note however, that this **aperture is used almost as a 'pen' to write** functionalize polymeric material onto the substrate, as opposed to a simple 'stencil' to form an image on the surface" (emphasis added). Further down page 16 on lines 17-24, it is taught that a "**mask** consisting of ~100 micron **holes** was attached to the Mask Plate and the substrate was raised to **within a few microns** of the Mask Plate.... monomer flow rate....Subsequently, a plasma was excited... to provide microdots... plasma polymer on the area of the substrate immediately beneath the mask plate" (emphasis added). **Page 17**, lines 6-9 further disclose using the method described to make plasma microdots to deposit microtracks by moving the sample beneath the mask plate so as to write the tracks, & lines 15-20 provide a particular example of writing plasma gradients using "**a mask consisting of a single ~100 micron hole** was attached to the mask plate, and a piece of silicon wafer as a substrate was **raised as close as possible to the mask without touching** (as described above)... mixture of monomer gases was varied concomitantly with the linear movement of the sample beneath the mask..." (emphasis added).

Thus, the examiner finds that while the language "at least one aperture" was not found, there is disclosure of using a mask with a single aperture, a single ~100 micron hole or ~100 micron holes (plural), which is of a somewhat narrower scope than the range of any number of apertures of any number of sizes claimed. While there is also discussion of "nib(s)" having disclosures for holes with a broader range of dimensions (page 14), so closer to the scope of the claimed apertures (but still limited in size), there is no clear relationship to the masking plate's aperture(s) and these disclosed nibs, thus "at least one aperture" appears to *encompass* **New Matter**. Furthermore, while the original disclosure as cited above indicates that the mask plate is separated from the substrate, the taught separation of the mask & the techniques with which the mask/mask plate is taught to be employed are in a much narrower scope than

Art Unit: 1715

claimed, as the taught uses of the mask require the substrate to be "as close as possible to the mask without touching" or within a few microns, which is a much narrower scope than the claimed "the mask plate being separated from the substrate" that is inclusive of all possible separations, especially as the claimed process merely requires the one or more apertures to be what "defines features of the deposited plasma polymer surface" is entirely consistent & reads on use of stencils & prefabricated masks, which are explicitly stated not to be the inventive process (page 6, lines 12-14 & page 16, lines 1-2), hence it appears clear that the way in which the mask plate is claimed to be employed is broader than the scope of the original disclosure, which as described above is significantly more restricted in what kind of spacings are employed between the substrate & the mask/mask plate, thus in this respect also the amended claims clearly *encompass* **New Matter**.

The previously cited support & other sections of the original specification were previously reviewed for consideration of whether **claim 43 (& the option (i) in claim 41)**, which claims moving the "**monomer source**" (i.e. the source of the monomer gas or vapor or solid [state of monomer unlimited], as opposed to the plasma source or plasma produced from monomers or as literally claimed plasma created by monomers, which assuming it is a gaseous plasma the plasma inherently comprises various excited monomer species, **but it is not the monomer source**) relative to the substrate. *Applicants are advised to review their own figure 1, where the equivalent of the claimed "monomer source", while not shown, would appropriately be attached to the illustrated "Monomer/Gas Inlets".* The paragraph bridging pages 15-16 & further discussion of "writing" using a mask with holes attached to the mask plate (on page 16) are concerned with moving the substrate, and have no movement of either the plasma source, the plasma outlet through the mask, let alone the monomer source itself (also see figure 1), where the latter is what is claimed in **claim 43**. While original claim 1 recited moving the monomer source across a surface [to be deposited on], it did not relate to the presently claimed mask plate, i.e. mask, as well as having other problems which were previously discussed, thus still does not supply support to the present combination

Art Unit: 1715

of claim limitations. Page 5, lines 22-31, discussed drawing or writing a pattern using a micrometer scale orifice or microcapillary to write a molecular architecture on a surface, which teaching is describing a nozzle type structures, not the claimed mask, nor is it considered directed to moving "the monomer source", as the source of the monomer is a different entity than the plasma, as **the monomer is supplied to the plasma** (important process distinctions analogous to those previously discussed), it is not the plasma itself. *If applicants truly want to claim actions such as moving their reagent sources, such as gas bottles or vaporizers, or the like around (action that is encompassed by the claims as literally written), the examiner does not believe that it will have any useful or unobvious effect whatsoever on the deposition process.* On page 6, lines 7-15, plasma writing is discussed as being able to create chemical & molecular architectures having two or three dimensional patterns, where no particular technique of plasma writing is described, but generally it is contrasted as being "without the need to prefabricated masks or stencils", thus it's not describing the claims *as written*, which still may use a pre-fabricated mask, i.e. a mask plate that separates substrate from deposition source, which is a mask & which was previously formed. Page 6, line 25-page 7, line 12 have various disclosures of moving the substrate relative to the monomer source & vice versa, & using a precision XYZ stage to move either substrate or plasma source, however there was no discussion found of employing a mask & moving the "monomer source", or even employing a mask & moving the plasma source relative to the substrate, thus this combination of limitations as presently written would appear to still encompass New Matter. It is noted that applicants amendments with respect to the mask, in no way affect this New Matter rejection with respect to moving the monomer source.

Note that claim 42, in choosing the option of 41(ii) does not have the problem as discussed above with respect to claim 43 & option (i), especially considering that original independent claim 1 discussed moving the monomer source across the substrate surface.

Art Unit: 1715

All the claims do however have the problem caused by the scientifically illogical word association in claim 41 as discussed above in section 3, which is requiring the organic monomers to be the source of the production of the plasma, which while it may be an unintentional meaning due to inaccurate phrasing, it provides a meaning which may be considered **New Matter**, since the original disclosure does not appear to teach or enable using organic monomers to create plasma, only to employ them when creating plasma for plasma polymer deposition, an important distinction. Claiming scientifically illogical & inaccurate actions is not a mere matter of preference (i.e. writing style) as implied by applicants' arguments. That someone might be able to **guess** what actions applicants actually intended to be performing it does not mean that the claim language is sufficiently clear, as one is not supposed to have to **guess** the intent of the claims.

4. The **nonstatutory double patenting** rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

The following is a quotation of the appropriate paragraphs of **35 U.S.C. 102** that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Art Unit: 1715

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 41-42, (43), 44, 47, 50, 63 & 67-76** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Dai et al.** ("Surface Modification by Plasma Etching and Plasma Patterning"), who teach plasma polymerization techniques according to **Gengenbach et al.** ("A Multi-Technique Study of the Spontaneous Oxidation of n-Hexane Plasma Polymers"), in view of **Kanbe et al.** (2004/0169004 A1) &/or Nakayama et al. (2002/0014415 A1).

Applicants have added limitations to the independent claim 41 with respect to the mask employed, now requiring at least one aperture in the mask plate, instead of [an] aperture (this feature was previously covered as repeated below); and now requiring that the mask plate be spaced from the substrate, which differentiates it from the masking teachings of **Dai et al.**, who generically discusses using a mask (abstract; second paragraph of experimental section, page 9549; figures 5, 7 & 9; and conclusions on page 9553), with the specific illustrated example of figure 1 demonstrating use of a mask which is in contact with the surface for performing either processes of plasma etching or plasma polymerization, hence while **Dai et al.**'s generic teachings could be considered to encompass masks that are not in contact with the surface being patterned, as the teachings provide are not excluding such configurations, neither do they specifically suggest the claimed separation.

However, Kanbe et al. ((004): abstract; figures, esp.9 & 23; [0018-27, esp. 122-123] ; [0166]; & [0180-184]) who teach plasma treating a surface to effect the affinity of the surface by at plasma treating through a mask ([0122] & [0180]), which may be spaced from the substrate as illustrated in figure 9 or deposited on the substrate as illustrated in figure 23, and while these examples are employing argon plasma is to create very affinity effects [0166] indicates plasma polymerization may also induced in affinity effects. Therefore, it would've been obvious to one of ordinary skill in the art, given that plasma treatment for patterning analogous to those taught by Dai et al. can be performed with masks on substrate as illustrated by Dai et al., or equivalently spaced from substrate, to perform such plasma polymerization patterning via either techniques, with reasonable expectation of effective results, especially given the implications and Kanbe et al. that plasma polymerization may be used to produce analogous plasma induced affinity effects.

Alternatively, Nakayama et al. ((415): abstract; Figure 5; [0010-11, esp. 11]; [0032-33]; [0042]; [0046-52], esp. [0050-51]; claims 1 & 11-12) teach deposition of features for sensors which may include patterned arrays deposited using a shadow mask that is a solid film having one or a plurality of apertures, where the size, shape and the distance of the mask from the substrate is taught to be optimized based on a particular electronic configuration desired, where such teaching necessarily includes separation from the substrate. One set of features being deposited by Nakayama et al. include non-conductive materials that may be insulating polymers as listed in [0032], or may employ multiple different polymers so as to generate different polymer compositions [0033], where the various methods that may be employed to deposit the polymer on the conducting layer may be plasma polymerization [0042]. Nakayama et al. further teach with respect to their process employing a system that automatically moves mask &/or substrate, so that different sensor elements can be deposited without having to remove masks between depositions. Therefore, given the suggestion of masks used to former arrays of polymer depositions, that may be plasma polymerization depositions, where the distance between the mask & substrate is one of the

Art Unit: 1715

parameters that is expected to be optimized for producing desired configurations (i.e. patterns), and that the ability to move mask &/or substrate relative to one another can be advantageous in the deposition process, it would've been obvious to one of ordinary skill in the art to apply these teachings to the process of Dai et al., where routine experimentation to optimize for desirable mask-substrate separation distances, especially when employing automated systems to move mask &/or substrate for the taught advantage of using the mask in plural depositions.

Furthermore, the teachings of Kanbe et al. & Nakayama et al. complement each other, together providing further motivation, as one illustrates the two options of employing the mask on the substrate or separated therefrom, while not the bureau at all provides teachings that mask-substrate distance is a consideration for optimization, where both references have suggestions of employing plasma polymerization.

As previously discussed, Dai et al. (abstract; figures 1, 7 & 9; p. 9549, Experimental Section, Materials & Plasma Treatment and Electrochemical Polymerization; p. 9550-9552, Pattern Formation by Plasma Polymerization; p. 9553, Conclusions; & reference citation 20) teach **plasma patterning** employing a **mask** via **plasma polymerization** (or alternatively via plasma etching), so as to only deposit plasma polymers on surfaces exposed by apertures in the mask. Substrates employed in the process examples include mica sheets, perfluorinated ethylene-propylene copolymer (FEP) & polytetrafluoroethylene (PTFE) coated with gold or platinum. Dai et al. teach that plasma polymerization enables fabrication of thin polymeric films with a wide range of compositions, since almost all volatile **organic compounds** can be used as monomers in the process, where they provide *examples of alcohol vapors*, such as **methanol** or **ethanol** being employed to produce hydrophilic films with hydroxyl groups thereon, or **n-hexane** monomer employed to deposit plasma polymers with a hydrophobic character (§ bridging p. 9550-9551, note both examples are saturated organic monomers), with individual examples of methanol plasma polymer patterns & n-hexane plasma polymer patterns, starting on pages 9551 & 9552,

Art Unit: 1715

respectively, where the SEM micrograph photos of the pattern deposits (separated hexagonal or square repeated features) may be considered to be essentially spatially separated dots. The mask employed by Dai et al. separates the monomers source from the deposition surface & is considered to be in the shape of a plate, in that it is planar & illustrated as not part of the sub trade & its surface (i.e. separately labeled as mask, separated therefrom after processing & indicated to be a TEM grid that has windows, e.g. 50 μm hexagons, 2nd full paragraph on p. 9550). In their experimental section, Dai et al. teach that they employ the plasma equipment & detailed procedures used for plasma treatment & plasma polymerization in their cited reference 20, which is **Gengenbach et al.**, thus essentially incorporating by reference the teachings with respect to plasma polymerization as found therein.

In **Gengenbach et al.** (pages 1400-1401, Experimental, Materials & sample fabrication), is taught that the plasma polymerization technique uses extended length of tape in a semicontinuous process, where an important feature of the taught plasma polymerization system is the **transport system for moving extended lengths of tapes through the plasma**, providing the advantage of a continuous plasma treatment over a batch of substrates, providing the capability of coating plasma polymers using a stabilized plasma, so spatial nonuniformities into transport direction may be minimized, however where no compensation has been made for spatial nonuniformities across the tape, such that significant distortions in uniformity were observed on the outer edges of the tape (especially see 1st col. on p. 1401). While Gengenbach et al. do not appear to discuss whether the nonuniformity on the edges of the tape is physical distribution or chemical distribution, as their sample assessment is significantly directed to chemical analysis (see section bridging p. 1401-1402), one of ordinary skill in the art would reasonably conclude that the significant distortions along the outermost edges of the tape substrates encompass both physical distribution & chemical distribution nonuniformities, as the edges would've been furthest from the plasma polymer deposition source material, thus providing a reasonable expectation of both decreased amounts of deposition & a decrease in the larger fragmentation species of the plasma polymer monomer reaching the

Art Unit: 1715

edges, thus altering composition of the deposit. Also note that Gengenbach et al. discarded from their experimental analysis the start & in portions of the plasma polymer deposits, also in order to minimize inclusion of nonuniformities in their sample analysis.

As Dai et al. is employing the plasma processing techniques & apparatus of Gengenbach et al., they're thus considered to be employing a substrate that is transported through the plasma polymerization apparatus, where the substrate is being moved relative to the plasma polymerization deposition source. The apparatus may also be considered to produce nonuniformities with respect to the outer edges of the semicontinuous substrates employed in this apparatus, as well as possibly at the start & stop of the plasma process. As the process of Dai et al. also requires use of masks in order to cause pattern deposition of the plasma polymer deposited via the apparatus of Gengenbach et al., the claimed substrate, plasma source & mask configuration as claimed may be considered disclosed by Dai et al. Alternatively, as Dai et al. specifically state that they use the apparatus & plasma polymerization deposition techniques as recited in Gengenbach et al., it would've been obvious to one of ordinary skill in the art to employ the apparatus as taught in the suggested reference, including employing its important features concerning transport of the substrate during plasma polymerization deposition, in order to enable deposition on essentially a plurality of samples.

While Dai et al. (or Gengenbach et al.) do not discuss the **vapor pressure** of their exemplary organic monomers, thus does not say what whether either methanol or *n*-hexane have a vapor pressure of at least 6.6 times 10^{-2} mb at room temperature (e.g. ≥ 0.05 Torr = 0.05 mm Hg = 50 mtorr), however **methanol** has a vapor pressure of 40 mm Hg at 5°C, 100 mm Hg at 21.2°C & 1 atm at 64°C; **hexane** has a vapor pressure of 100 mm Hg at 15.8 °C & 1 atm at 68.7°C; while **ethanol** also suggested (but not exemplified) by Dai et al. has a vapor pressure of 40 mm Hg at 19°C, 100 mm Hg at 34.9°C & a vapor pressure of 1 atm at 78.4°C, thus all the specific monomers suggested by Dai et al. clearly meet the criteria of the minimum vapor pressure at room temperature claimed by applicants.

Note since either Dai et al. or Gengenbach et al. input monomer vapor into their RF powered plasma apparatus, this monomer source material for the plasma polymerized deposits may be considered to move with respect to the substrate, as the monomer vapor considered as a monomer source must move in order to be processed by the plasma & be deposited on the substrate. This will be true of any plasma polymerization deposition technique.

With respect to the claim of tracks or lines, this is a design choice, which would have been dependent on the particular enduse with which plasma polymers were desired to be employed, with further noted that in their conclusion is Dai et al. suggest use of the plasma polymerization patterning techniques for region specific depositions of various chemicals and/or biological functionalities, especially when used in conjunction with other surface derivation techniques. Therefore, it would've been reasonable for one of ordinary skill in the art to assume the usefulness of patterning according to particular and uses within the wide suggestion of usefulness proposed by Dai et al., which would reasonably have been expected to encompass lines & tracks.

Also while Dai et al. do not discuss heterogeneous plasma polymer deposits in their pattern deposition, as indicated by Gengenbach et al. nonuniformity exists in their plasma deposition apparatus at the start & stop of the process, plus at the outer edges, thus when Dai et al. is employing this apparatus, their patterned plasma polymer deposits would also have these nonuniformities, which would have reasonably been expected encompass physical & chemical nonuniformities with respect to deposition in comparison to the plasma deposits in the central area of the substrate & during the stable portion of plasma polymerization deposition (i.e. excluding start and stop).

It is further noted that while Dai et al. provide exemplary substrates inclusive of metal film surfaces & plastic substrates (FEP & PTFE), they do not mention specific plastic substrates of polyethylene terephthalate, polyethylene, polyvinylchloride, polypropylene or polystyrene, however their particular plasma polymerization patterning techniques is not dependent on the particular substrate

Art Unit: 1715

material employed, thus use of any conventional substrate would reasonably have been obvious to one of ordinary skill in the art, where all of applicants' specifically claimed plastics would have reasonably been considered conventional by one of ordinary skill, and furthermore their particular exemplary polymer substrates include ethylene or ethylene & propylene structures, such that it would've been further obvious to one of ordinary skill in the art to reasonably expect polypropylene & polyethylene substrates to be effective in the taught process.

6. **Claims 41-76 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 85, 87- 110, 112-122 of copending Application No. 10/560,210, in view of Dai et al. ("...Plasma Patterning"), in view of Kanbe et al. (2004/0169004 A1) &/or Nakayama et al. (2002/0014415 A1), discussed above .**

Although the conflicting claims are not identical, they are not patentably distinct from each other because while limitations are claimed in different orders, the various limitations of the present claims, are also claimed in this copending case, where present independent claim 41 encompasses aspects of the process of **copending (210)**'s independent claim 85, which is narrower in that it requires further coating on the plasma polymerized surface of a "binding entity", however the present claims do not exclude such a sequential process., with the copending claims now also required to comprise an alkene having up to 20 carbon atoms (i.e. present claims 56, 58-60, 64-66) & a vapor pressure as in present claim 63. It is noted that copending claim 85's limitation of moving plasma source (or monomer source) &/or substrate relative to one another, have now been deleted. The current independent claim has been amended to require their nonuniformity to be created by use of a mask with one or more apertures which mask is spaced from the substrate, thus while overlapping with respect to the various monomers that may be employed in the plasma polymerization process, the present claims differ from the generalized techniques used when plasma polymerizing of copending (210), however as seen above **Dai et al.** make it clear that it is old and well-known to create patterned plasma polymerization depositions using a mask between the

Art Unit: 1715

plasma source & the substrate surface, including with suggestions of using such plasma processing for region specific deposition of various chemical &/or biological functionalities, while **Kanbe et al.** &/or **Nakayama et al.** make it clear as discussed above that either masks on substrates or spaced apart above substrates are known for plasma patterning, with suggested teachings of optimizing separation distance & expected of effectiveness with plasma polymerization, hence it would've been obvious to one of ordinary skill in the art, when performing the plasma polymer deposition process of copending (210), to employ masking for pattern deposition as set forth in the present claims, which is directed to the suggested chemical &/or biological functionalities. Also note how that N-vinyl pyrrolidone in copending claim 102 is a heterocyclic unsaturated compound.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

7. **Claims 51, 54-55, 61 & 76** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Dai et al.** ("...Plasma Patterning"), who teach plasma polymerization techniques according to **Gengenbach et al.** ("A Multi-Technique...Plasma Polymers"), in view of **Kanbe et al.** (2004/0169004 A1) &/or **Nakayama et al.** (2002/0014415 A1), as applied in claims 41-42, (43), 44, 47, 50, 63 & 67-76 and further in view of **Morra et al.** (5,514,424).

While **Dai et al.** teach that a wide variety of compositions, including almost all volatile organic vapors can be used as monomers for plasma polymerization processes, they do not provide specific suggestions corresponding to all the individual categories of organic monomers claimed by applicants, however as previously discussed **Morra et al.** showed that plasma polymer deposition employing fluorocarbon monomers (col. 3, lines 1-16) is old and well-known to have been affected, such that it would've been obvious to one of ordinary skill in the art to employ such fluorocarbon monomers for alternatives to the specific examples of **Dai et al.**, for their suggested a wide variety of compositions using volatile organic vapors, with a reasonable expectation of affected & useful deposits. Furthermore, **Morra**

Art Unit: 1715

et al. in teaching useful substrates on which depositions may be performed include polypropylenes, polyethylenes, PET, polystyrene, etc. (col. 3, lines 21-34), thus providing cumulative evidence for the above assertions concerning obvious & conventional substrate materials.

As previously discussed, **Morra et al.** teach plasma polymer deposition of a fluorinated polymer on substrates, such as high-density polyethylene, where exemplary fluorocarbon monomer employed was perfluoropropene, which the examiner notes has a boiling point of -29.4°C, thus clearly has vapor pressures within the claimed range at room temperature (abstract; col. 3, lines 1-34 & 65-44 (Ex. 1), particularly further noting the teaching in col. 6, lines 60-61 which states "...due to the more heterogeneous chemical structure of the polymer is produced by plasma polymerization", thus showing a general recognition in the art that plasma polymerization inherently it produces structures that may be called heterogeneous, where the examiner notes that since molecular structure variation may also be considered a physical variation, this heterogeneity is both chemical & physical.

While **Morra et al.** does not specifically list perfluorohexane, they do specifically teach that the monomers are selected from the group consisting of perfluorinated alkanes or alkenes from 1-10 carbons (col. 3, lines 7-15), which is inclusive of perfluorohexane which has 6 carbons.

8. **Claims 45-46, 53-55, 61, 64-65 & 70** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Dai et al.** ("...Plasma Patterning"), who teach plasma polymerization techniques according to **Gengenbach et al.** ("A Multi-Technique...Plasma Polymers"), in view of **Kanbe et al.** (2004/0169004 A1) &/or **Nakayama et al.** (2002/0014415 A1), as applied in claims 41-42, (43), 44, 47, 50, 63 & 67-76 and further in view of **Renner et al.** ((DD 94657), see translation).

While **Dai et al.** teach that a wide variety of compositions, including almost all volatile organic vapors can be used as monomers for plasma polymerization processes, they do not provide specific suggestions corresponding to all the individual categories of organic monomers claimed by applicants, nor specifically suggest mixtures of monomers (although such would be encompassed in their general

Art Unit: 1715

disclosure), however **Renner et al.** teach plasma polymerization deposition techniques employing one or more organic monomers, so as to deposit coatings having different or identical characteristics at different distances from its base surface, where the substrate being deposited on is kept in motion during the deposition process, thus specifically teaching combination of monomers, i.e. copolymers, as well as intentionally providing controlled variation in composition. In their specific examples, Renner et al. provide example of specific single siloxane monomers of hexamethyl disiloxane or octamethyltrisiloxane, both of which are saturated organic monomer compounds, either comprising hydrocarbon ligands. Therefore, it would've been obvious to one of ordinary skill in the art to employ such plasma polymerizable monomer or monomers, e.g. siloxanes, as taught by Renner et al. in the process of Dai et al., with the reasonable expectation of being able to provide effective pattern plasma polymerization deposits, including the advantage of being able to optimize the composition of the deposit to provide desirable characteristics differentiated between substrate interface & surface, providing cumulative evidence and motivation for creating such structures, especially further considering that the plasma polymerization process of Renner et al. is analogous to that of Dai et al. as described by Gengenbach et al. in also employing continuous movement during deposition.

As previously set forth, **Renner et al.** teach a plasma polymerization technique, where the substrate, a magnetic storage medium exemplified by disks or tape, is kept in motion during the plasma polymer coating process, and where the composition & degree of polymerization of the deposited polymer coating is changed by control of the deposition process parameters &/or mixing ratio of various monomers, or a monomer & inert gas, so that the coating has different properties at different distances from the substrate surface. In example 1, plasma deposition on magnetic recording media disc substrates is performed at a constant pressure of 5 Torr, with an initial partial pressure of hexamethyldisiloxane of 10^{-3} Torr, which is continuously increased during deposition in order to reduce the degree of polymerization, thus producing a nonuniform deposit, which results in desirable characteristics with

Art Unit: 1715

respect to bond strength to the substrate & elasticity on the upper surface. In example 2, a magnetic storage medium in tape form (e.g. substrate would be polymeric = plastic) is passed between electrodes in a plasma atmosphere of octamethyltrisiloxane at 0.5 Torr (i.e. $>0.05 \text{ Torr} = 6.6 \times 10^{-2} \text{ mb}$), using two electrode systems of different lengths with plasma being generated at different voltages to effect the taught differentiated plasma polymer deposition. In the translation, besides the examples, also see the 2nd-5th paragraphs on the 2nd page & claims, esp. 1-3.

While the specific examples only employed a single type of monomer compound, i.e. hexamethyldisiloxane or octamethyltrisiloxane, both organosiloxane compounds having saturated hydrocarbon ligands (i.e. may be considered a saturated organic compound & a type of hydrocarbon compound), the generic teachings also indicate that mixtures of various monomers may be employed, thus reading on copolymeric depositions. These teachings are considered suggestive of copolymeric depositions involving at least one organic monomer with at least one hydrocarbon, as suggested use of monomer mixtures would reasonably have been considered with respect to the to exemplified monomers employed with other monomers or each other, such that it would've been obvious to one of ordinary skill in the art via routine experimentation to determine reasonable & effective monomer mixtures given these considerations.

Also note that depositing on tapes, may be considered effectively depositing in tracks or lines of deposition. Plasma polymerization inherently meets the requirement of heterogeneous chemical or physical, such that any plasma polymerized deposition may be considered heterogeneous through its thickness & over its surface.

Note with respect to substrate composition, while magnetic tape medium, as far as the examiner knows are always polymeric, i.e. plastic, the translation does not actually say that the tapes coated are plastic, however it would've alternatively have been obvious to one of ordinary skill in the art to employ

conventional compositions for magnetic tapes, i.e. plastics such as PET, as that is what is standardly known to be employed for such purposes.

While discussion in the translation indicates movement of the substrate with respect to the plasma, which may be considered the monomer source, with indication that the storage medium, i.e. substrate is kept in motion during the plasma polymerization process, it would have alternatively have been obvious to one of ordinary skill in the art that equivalent relative effects would have been produced by moving the plasma source with respect to the substrate, such that this would have been an obvious alternative, dependent on particular shape of the magnetic recording medium desired to be protectively coated.

9. **Claims 48, 50-52, 54-58 & 61 (62)** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Dai et al.** ("...Plasma Patterning"), who teach plasma polymerization techniques according to **Gengenbach et al.** ("A Multi-Technique...Plasma Polymers"), in view of **Kanbe et al.** (2004/0169004 A1) &/or **Nakayama et al.** (2002/0014415 A1), as applied in claims 41-42, (43), 44, 47, 50, 63 & 67-76 and further in view of **Badyal et al.** (6,358,569 B1), optionally considering **Timmons et al.** (6,306,506 B1) for claims 52 & 57.

While **Dai et al.** teach that a wide variety of compositions, including almost all volatile organic vapors can be used as monomers for plasma polymerization processes, they do not provide specific suggestions corresponding to all the individual categories of organic monomers claimed by applicants, however **Badyal et al.** provide teachings of alternative monomers (unsaturated-carboxylic acid monomers, such as acrylic acid, or alternatively suggested a ethylene oxide or styrene oxide; or plasma derived CF_3 which causes further plasma polarization by reacting with carboxylic acids or esters on the surface on col. 5, lines 36-40; or background discussion) to be used in plasma polymerization to be applied to other polymers such as polyethylene & for biocompatible properties, thus it would've been obvious to one of ordinary skill the art to use subject materials & monomers as suggested by **Badyal et al.**

Art Unit: 1715

in the teachings of Dai et al. as discussed above, with the reasonable expectation of their effective pattern deposition via the primary reference(s) teachings. While these teachings do not specifically specify the monomer of tetraethylene glycol mono allyl ether, the related ethylene oxide monomer & other O-containing hydrocarbons would have reasonably suggested to one of ordinary skill in the art that plasma polymerization of analogous O-containing hydrocarbon compounds would have also been expected to be effective. Alternatively, Timmons (6,306,506) directed to analogous plasma processing techniques (abstract; summary; col.6-8, etc.), besides teaching many other relevant monomers, is noted to provide cumulative evidence of the obviousness of employing allyl glycidyl ethers (table of monomer examples in col. 9), such that the specific species on tetraethylene glycol mono allyl ether, would've been further obvious to one of ordinary skill in the plasma polymerization art.

As previously set forth, **Badyal et al.** teach pulsed plasma polymerization of monomers, such as **unsaturated-carboxylic acid**, or **acrylic acid** or **ethylene oxide** or **styrene oxide**, to deposit on substrates that may be porous or microporous material, such as polyethylene or cellulose, etc., where the coating may be applied such that it is continuous & impervious, or the process may be stopped at an earlier stage such that the apertures in the porous material are not completely filled, dependent on desirability for particular enduse, which is inclusive of uses requiring biocompatible properties. The option of incompletely filling pores on porous material created a plasma polymerize surface that was considered nonuniform across the surface to a greater degree than general heterogeneity of plasma polymerized deposits when parameters or materials in the plasma are not varied. An exemplary procedure discusses plasma polymerization of **acrylic acid** monomer input into the plasma reactor as a monomer vapor admitted via a needle valve to a pressure of 0.2 mb. Particularly see the abstract; col. 1, line 1-col. 2, lines 5 & 40-58, esp. col. 1, lines 43-54 & 62-col. 2, line 5; col. 3, lines 38-45 & 54-col. 4, line 12; col. 5, lines 37-41.

10. **Claims 45-46, 48-49, 51, 53-56, 58-61, (62) & 64-66** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Dai et al.** ("...Plasma Patterning"), who teach plasma polymerization techniques according to **Gengenbach et al.** ("A Multi-Technique...Plasma Polymers"), in view of **Kanbe et al.** (2004/0169004 A1) &/or **Nakayama et al.** (2002/0014415 A1), as applied in claims 41-42, (43), 44, 47, 50, 63 & 67-76 and further in view of **Nomura** (6,022,602)..

While **Dai et al.** teach that a wide variety of compositions, including almost all volatile organic vapors can be used as monomers for plasma polymerization processes, they do not provide specific suggestions corresponding to all the individual categories of organic monomers claimed by applicants, however **Nomura** (602) also teaches plasma polymerization involve the movement of substrate & monomer gas/vapor in order to provide effective plasma polymer deposition, where **Nomura** provides teachings with respect to monomers & mixtures of monomers that would have reasonably been expected by one of ordinary skill the art to have been effective in the process of **Dai et al.**, as providing other known & conventional monomer vapors for plasma polymerization processes.

It was previously noted that the type of motion employed, would have been expected to be depended on the particular type of substrate being treated, with **Nomura** ((602): abstract ; figures, esp.1; col. 1, lines 15-60; col. 2, lines 32-65; col. 3, lines 38-65; col. 4, lines 35-50; col. 7, lines 15-50; col. 8, lines 65-col. 9, lines 40 & 56-63; col. 10, lines 5-10 & 50-59; col. 12, lines 7-20 & 42-67; col. 13, lines 7-25 for monomers & 26-44+ for more parameters; & examples) considered in this respect & due to discussion of **plasma polymerization** on the interiors of continuous tubing, such as may be used for **medical devices** like catheters, vascular grafts, etc., where the tubing is passed through a plasma polymerization zone, thus is also consistent with the type of movement of substrates taught in **Dai et al.** for continuous substrates, thus further providing for the obviousness of such movement. The types of substrate material being coated by plasma polymerization, also include conventional plastics such as polyvinylchloride, polyethylene terephthalate, polyolefins, polyfluorinated compositions, thus are

Art Unit: 1715

consistent with substrates as discussed in Dai et al., providing cumulative evidence with respect to expected useful polymeric substrates as asserted above. It is also taught that such tubing, which is porous, but has low porosity, may require their techniques of having periodic sequential openings to allow input of monomer gases to the interior, or their background discussion that it was known to perform such plasma polymerization on sufficiently porous tubing, thus is also consistent with possible meanings of required movement of monomer source & the importance thereof for effective deposition. With respect to particular deposition materials, Nomura (602) provides teachings of using **monomer vapors or mixtures of monomer vapors**, with further discussion of monomers that may effectively be deposited via plasma polymerization processes on such surfaces, inclusive of **tetrafluoroethylene** to create polyfluorocarbon surfaces, & **siloxanes** such as **hexamethyldisiloxane** to create polysiloxane deposits, **alkanes & alkenes, acrylic acid, allylamine, benzene, styrene, diaminocyclohexane**, etc., such that it would've been further obvious to one of ordinary skill to deposit such monomers in the plasma polymerization as discussed in Dai et al., in accordance with the teachings of Gengenbach et al. plasma techniques/apparatus, as discussed above, given the alternative monomers effectiveness in analogous processing has been demonstrated, including on overlapping substrate materials & with respect to overlapping hydrocarbon compounds, plus as their desirability for enduses analogous to suggested biological uses provides further motivation, as well as effectiveness in depositing while employing analogous motions.

11. **Claims 45-46, 48-66 & 76** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Dai et al.** ("...Plasma Patterning"), who teach plasma polymerization techniques according to **Gengenbach et al.** ("A Multi-Technique...Plasma Polymers"), in view of **Kanbe et al.** (2004/0169004 A1) &/or **Nakayama et al.** (2002/0014415 A1), as applied in claims 41-42, (43), 44, 47, 50, 63 & 67-76 and further in view of **Muguruma et al.** (7,087,149 B1 \equiv WO 00/63685), optionally considering **Timmons et al.** (6,306,506 B1) for claims 52 & 57.

While **Dai et al.** teach that a wide variety of compositions, including almost all volatile organic vapors can be used as monomers for plasma polymerization processes, they do not provide specific suggestions corresponding to all the individual categories of organic monomers claimed by applicants, however **Muguruma et al.** (discussed below) teach plasma polymerization employing various monomers or monomer mixtures for creation of biosensors, where the retention of various functional groups, such as acid, alcohol, amines, ethylene oxide, etc. is desirable, thus providing teachings concerning particular monomer use in plasma polymerization that one of ordinary skill the art would reasonably expect to be effective in the process of Dai et al., whose plasma polymerization process are in accordance with the teachings of Gengenbach et al., create plasma polymer deposits with overlapping functional groups, suggested for the types and uses provided by Muguruma et al.

As previously set forth, **Muguruma et al.** teach making a biosensor structure, where a preferred embodiment has 2 plasma polymerize layers, with an intervening patterned electrode layer, such that the resultant structure may be considered to be nonuniform, especially considering that chemically different plasma polymerized deposits count as nonuniform, in that the surface plasma polymer is not planar & does not have the same thickness over the whole surface, but the thickness changes where it crosses the electrode pattern having lines of thicker polymer at the edges of the electrode pattern. Also, where the first plasma polymer is directly overlaid by the second deposited plasma polymer, there are at least two plasma polymers formed on the surface, such at the composition where they interface may be considered different, providing a compositional nonuniformity. The surface plasma polymer provides binding sites for biomolecules, such as enzymes, where the overall structure is used for analysis purposes. With respect to plasma polymer deposition processes, Muguruma et al. teach that the plasma polymers may contain one or more functional groups inclusive of **acids** (-COOH), **hydroxy** (-OH), **amines**, -CH=CH₂ (alkenes), **ethylene oxide** (e.g. epoxide or ethylene glycol) groups, etc., where such functional groups may be supplied in single monomer gases or mixtures of monomers, & include such compounds as

Art Unit: 1715

allylamine, methanol, acetic acid, acrylic acid, hexamethyldisiloxane, hexamethylcyclotrisilazane, etc.

Note that these functional groups also provide "nonuniform characteristics" being heterogeneous chemical variations. Substrate boards may include glass or plastic or silicon or cellulose. Muguruma et al. teach that plasma polymerization conditions can be appropriately set by one of ordinary skill in the art dependent on monomer gas employed, where exemplary pressures for gases such as hexamethyldisiloxane or acetonitrile monomers include pressures of 1-10 Pa, i.e. 0.1-0.01 mbar. In Muguruma et al., particularly see in the US patent (considered to provide the translation for the Japanese PCT document), the abstract; figures 1-2; col. 1, lines 10-25+; col. 3, lines 15-32 & 66-col. 4, lines 20 & 38-col. 5, lines 30+; col. 6, lines 31-67; col. 7, lines 7-22; col. 8, lines 6-50; & examples, such as Ex. 1 on cols. 11-12.

Muguruma et al. differ by not discussing whether or not movement occurs with respect to substrate & monomer source (or plasma), however as discussed above the movement of the monomers into & through the plasma may be considered inherent in the process & relevant to the claims has written, and the primary reference(s) provides reasons for movement of the substrate, plus patterning via masking therewith, thus it would've been obvious to one of ordinary skill in the art to alternative monomers as taught to optimize their plasma polymer deposition for specific alternative purposes, such as to create more effective biosensors due to effective distribution of functional groups on the surface.

While Muguruma et al. teach various oxygen-containing hydrocarbon compounds & specify ethyleneoxide as a desirable functional group to employ (col. 4, lines 1-9 & 55-67; col. 6, lines 30-45), they do not appear to particular specify employing tetraethylene glycol monoallyl ether, however it would've been obvious too one of ordinary skill in the art to employ specific O-containing hydrocarbon is having taught groups such as ethyleneoxide, such that it would've been further obvious to one of ordinary skill in the art to employ the specific claimed ethylene oxide compounds in plasma polymerization with reasonable expectation of effectively providing oxygen functionalized plasma polymers as a deposit.

Alternatively, Timmons (6,306,506) directed to analogous plasma processing techniques (abstract; summary; col.6-8, etc.), besides teaching many other relevant monomers, is noted to provide cumulative evidence of the obviousness of employing allyl glycidyl ethers (table of monomer examples in col. 9), such that the specific species on tetraethylene glycol mono allyl ether, would've been further obvious to one of ordinary skill in the plasma polymerization art.

12. Claims 45-46, 48-49, 51, 54-56, 58-61, (62), 64-66 & 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dai et al. ("...Plasma Patterning"), who teach plasma polymerization techniques according to Gengenbach et al. ("A Multi-Technique...Plasma Polymers"), in view of Kanbe et al. (2004/0169004 A1) &/or Nakayama et al. (2002/0014415 A1), as applied in claims 41-42, (43), 44, 47, 50, 63 & 67-76 and further in view of Nomura et al. (5,843,789).

While Dai et al. teach that a wide variety of compositions, including almost all volatile organic vapors can be used as monomers for plasma polymerization processes, they do not provide specific suggestions corresponding to all the individual categories of organic monomers claimed by applicants, however Nomura (789) also teaches plasma polymerization involve the movement of substrate & monomer gas/vapor in order to provide effective plasma polymer deposition, where Nomura provides teachings with respect to monomers & mixtures of monomers that would have reasonably been expected by one of ordinary skill the art to have been effective in the process of Dai et al., as providing other known & conventional monomer vapors for plasma polymerization processes.

As previously set forth, Nomura et al. ((789) abstract; figures 1-2; col. 3, lines 27-57; col. 4, lines 10-20; col. 5, lines 10-60; col. 6, lines 5-50; col. 7, lines 7-34 & 50-col. 8, lines 25 & 55-65; col. 9, lines 1-10, 22-40 & 55-65; col. 10, lines 12-50; and examples & claims) teach plasma polymerization deposition of claimed monomer(s) (amines such as allylamine; carboxylic acids such as acrylic acid; halogenated olefins; cyclic compounds; monomers containing hydroxyls; vinyl or allyl olefins; etc.) on porous substrates that may be rotated on a disk so as to pass through a plasma formed with those

Art Unit: 1715

monomers, where the coating deposited on the porous substrate (polyethylene, polypropylene, polyvinylchloride, etc.) does not clog or fill the pores, thus is considered to be nonuniform across the surface on the order of the size of the pores as well as due to the plasma polymerization employed. This improved porous material is taught to be used for blotting analysis of proteinaceous & genomic matter, or in immunoassay analysis. As the plasma polymerization deposition is used for biological analysis are relevant to the process & suggested use of Dai et al.'s process what ordinary skill in the art would have found it obvious to employ any of the specific monomers or classes of monomers as suggested for plasma polymerization in the primary reference(s) teachings with reasonable expectation of success, effectiveness & usefulness.

13. **Claims 45-46, 49, 51, 53-56, 58-61, (62), 64-66 & 76** are rejected under 35 U.S.C.

103(a) as being unpatentable over **Dai et al.** ("...Plasma Patterning"), who teach plasma polymerization techniques according to **Gengenbach et al.** ("A Multi-Technique...Plasma Polymers"), in view of **Kanbe et al.** (2004/0169004 A1) &/or **Nakayama et al.** (2002/0014415 A1), as applied in claims 41-42, (43), 44, 47, 50, 63 & 67-76 and further in view of **Hu et al.** (5,463,010).

While **Dai et al.** teach that a wide variety of compositions, including almost all volatile organic vapors can be used as monomers for plasma polymerization processes, they do not provide specific suggestions corresponding to all the individual categories of organic monomers claimed by applicants, however **Hu et al.** teach monomer gas/vapor in order to provide effective plasma polymer deposition, where Nomura provides teachings with respect to monomers & mixtures of monomers that would have reasonably been expected by one of ordinary skill the art to have been effective in the process of Dai et al., as providing other known & conventional monomer vapors for plasma polymerization processes.

As previously set forth in **Hu et al.** (010), see the abstract; figures, especially 1-2; col. 1, lines 7-15+; col. 3, lines 48-col. 4, lines 18, 33-37, 42-67+; col. 6, lines 13-col. 7, lines 35; col. 8, lines 5-40 & 46-col. 11, line 3; & examples e.g. Ex.2 & 3 on cols. 11-12, which teach plasma polymerization using

Art Unit: 1715

only a single type of monomer of aliphatic hydrocyclosiloxane, or using mixtures of these siloxane monomers with comonomer(s) inclusive of **fluorocarbons** or organo based monomers or functional terminated monomers (e.g. **ethylene**, **allylamine**, **trimethyl silyl allylamine**, hydrocarbons, unsaturated amines...), to affect polymer or copolymer depositions via RF plasma onto substrates inclusive of silicon catheters, metal wire and fibers, such as polypropylene microporous hollow fibers, to produce "membranes" thereon. Taught enduses include biocompatible surfaces in biomedical devices. Note "aliphatic" includes both saturated & unsaturated hydrocarbons, i.e. alkanes & alkene, and the hydrocyclosiloxanes are heterocyclic compounds. Since the deposit the coating is described as a "membranes", it is considered an indication that the plasma polymer coated substrate remains microporous, thus may be considered nonuniformly coated across the surface with respect to the microporous structure, i.e. the pores aren't plugged.

Also see figure 20 which shows a 2-phase morphology of TMCTS plasma polymerized membrane on polypropylene where the plasma polymerization as seen in the SEM picture shows dots, but are spatially separated and made of plasma deposited phases of plasma polymer, which given applicants current phrasing which encompasses both macrostructure & microstructure both chemically and physically for heterogeneous or nonuniformity characteristics

14. **Claims 48, 52, 54-58 (& 62)** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Dai et al.** ("...Plasma Patterning"), who teach plasma polymerization techniques according to **Gengenbach et al.** ("A Multi-Technique...Plasma Polymers"), in view of **Kanbe et al.** (2004/0169004 A1) &/or **Nakayama et al.** (2002/0014415 A1), as applied in claims 41-42, (43), 44, 47, 50, 63 & 67-76 and further in view of **Yoshimura et al.** ("Guidelines for Preparation of Plasma-Polymer in View of Surface Functionalization of Solid Materials"), optionally considering **Timmons et al.** (6,306,506 B1) for claims 52 & 57.

While Dai et al. teach that a wide variety of compositions, including almost all volatile organic vapors can be used as monomers for plasma polymerization processes, they do not provide specific suggestions corresponding to all the individual categories of organic monomers claimed by applicants, however Yoshimura et al. (abstract; table 1; page 228, top half) also directed to plasma polymerization were surface functionalization of the material is taught, particularly using oxygen containing monomers & also mentioning that the plasma polymerize film formed on the substrate may be done while using masking, provides an exemplary list of useful oxygen containing monomers, inclusive of further organic alcohols, such allyl alcohol (e.g. 2-propen-1-ol) & furfuryl alcohol (a heterocyclic compound which would read on claim 62 if it was logically claimed); as well as other oxygen containing compounds such as acrylic acid or ethylene glycol or dimethyl ether ethylene glycol, etc. Therefore, it would've been obvious to one of ordinary skill in the art too employs such monomers that are effective in plasma polymerization deposition processes, including with masking, with a reasonable expectation that they would be effective in the process of Dai et al., especially considering that Dai et al. in using the techniques of Gengenbach et al., who teach the superiority of their plasma apparatus in plasma polymerization over conventional bell jar chamber structures as depicted in figure 1 of Yoshimura et al.

It is further noted that while tetraethylene glycol monoallyl ether is not specifically taught, Yoshimura et al. indicate the general usefulness of ethylene glycol containing compounds by providing examples of two compounds of that category, one of which is also in ether, hence given the taught usefulness of compounds of the same general category, it would've been further obvious to one of ordinary skill in the art to employ tetraethylene glycol monoallyl ether in the taught plasma polymer deposition of this combination, as they would have reasonably expected other ethylene glycol ether compounds to be analogously effective in plasma polymerization processing, inclusive of providing oxygen containing functional groups thereby. Alternatively, Timmons (6,306,506) directed to analogous plasma processing techniques (abstract; summary; col.6-8, etc.), besides teaching many other relevant

monomers, is noted to provide cumulative evidence of the obviousness of employing allyl glycidyl ethers (table of monomer examples in col. 9), such that the specific species on tetraethylene glycol mono allyl ether, would've been further obvious to one of ordinary skill in the plasma polymerization art.

15. **Claims 41-43 & 68** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Behn et al.** (4,508,049).

Behn et al. (abstract; figures; col. 1, lines 55-65; col. 2, lines 64-col. 3, lines 43 & 64-68; col. 4, lines 29-62; & col. 5, lines 1-22) teach plasma polymerization via a glow discharge techniques where the substrates called carriers are clamped into recesses 7, with masks (9, 19) employed to cover parts of the carriers that are not required to be coated. The masks are automatically moved into required positions in the vacuum chamber by shifting the mask as illustrated in figure 2 or 3, where the latter illustrates the mask 19 as spaced part above the carrier 17. During glow discharge polymerization, the drum rotates moving both masks & carriers relative to the plasma during the deposition process, where the mask 19's openings as illustrated may be considered to create lines or tracks. While **Behn et al.** teach that gas to be polymerized is blown into the glow discharge polymerization chamber via gas feed line 12 & apertures 13, we do not actually specify a gas employed for the polymerization process, however inherently must be a polymerizable gas, hence it would've been obvious to one of ordinary skill in the art, given the generic teaching of using a gas, i.e. a polymerizable gas, to use common & conventional forms of polymerizable gas, which would have been suggested & in place if of employing organic monomers in gaseous form, as monomers are generally the most readily vaporize able or found in vapor form reagents for polymerization.

16. **Other art** of interest includes: **Suzuki et al.** ((6,610,350 B2); col. 14, lines 50-63) with teaching of using a remote plasma source with an intervening plasma control member with many apertures space from lens substrates (figures 5-6) that are being plasma treated, as well as substrate holders (30) which as illustrated in figure is 2-4 act to create masking & **Chabreck et al.** (6,436,481 B1)

Art Unit: 1715

teaching plasma induced polymerization on lenses, where a removable pattern screen may be used as a mask on ophthalmic devices in plasma induced polymerization processes, which would make a reasonable combination by themselves, or in view of Timmons et al. discussed above, dependent on what applicants actually mean by their plasma limitations, however which are presently redundant in view of the above rejections.

Also of interest, **Itoh et al.** (6,001,431) showing spaced masking structures used to form linear plasmas, which illustrates the importance of defining what one means by spaced apart with respect to masks, plasma & substrates; while **Paquet** (5,985,378)'s figure 8a, described on col.8, lines 44-col. 9, line 9, particularly shows the effects of multiple discrete remote plasma inputs in treating a substrate moving thereunder; and **David et al.** (6,878,419 B2) who further shows the use of shadowmask's for to producing patterns or gradient depositions inclusive for plasma polymers, however their masks are also called contact masks, thus presumably are actually placed on the substrate.

Other art of interest, previously cited included: the Japanese reference to **Shinohara** cited in applicants 10/27/09 IDS relates to plasma polymerization onto a moving substrate, but does not discuss patterning thereof or masking; **Kurosawa et al.** ("Absorption of Anti-Human IgG to Plasma Polymerized Allylamine Film Formed on Silver Plate") directed to further plasma polymerized depositions used for assay purposes; **Timmons et al.** (5,876,753 & 2003/0113477 A1 & 2002/0004104 A1) which contain teachings analogous to those found in **Timmons** (6,306,506) discussed previously, which is noted to provide cumulative evidence of the obviousness of employing allyl glycidyl ethers (table of monomer examples in col. 9), such as tetraethylene glycol mono allyl ether.

Kolluri et al. (6,277,449 B1) provide teachings substantially similar to that of Muguruma et al. or Badyal et al., for producing plasma polymerize coatings with binding sites for further depositions, where the nonuniformity in the deposits of Kolluri et al. may be considered to be on the molecular level, such as illustrated in various functionalize surfaces, for example the resulting surface in figure 37 has three

Art Unit: 1715

different functional groups thereon, thus may be considered to be nonuniform across the plasma polymerized surface in this respect, however such a rejection is redundant at this time.

17. Applicant's arguments filed 3/2/2010 & discussed above have been fully considered but they are not persuasive.

Applicant's arguments with respect to claims 41-76 have been considered but are moot in view of the new ground(s) of rejection.

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

19. **Any inquiry** concerning this communication or earlier communications from the examiner should be directed to **Marianne L. Padgett** whose telephone number is **(571) 272-1425**. The examiner can normally be reached on M-F from about 9:00 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained

Art Unit: 1715

from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Marianne L. Padgett/
Primary Examiner, Art Unit 1792

MLP/dictation software

6/5-6/10